PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in or relating to Grinding Concave Spherical Surfaces.

We, NORDISKA KULLAGER AKTIEBOLAGET, of Regulusgatan, Hisingen, Göteborg, Sweden, a company duly organised and existing under the laws of Sweden, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to the grinding of concave spherical surfaces and has for its object to provide simple means for carrying out the known method in which the work-piece and the tool are turning round shafts, the centre lines of which intersect in the centre of the spherical surface in the work piece.

In the accompanying drawing, a plan view of a grinding machine according to our invention is shown.

In the drawing, 19 denotes a ring-shaped work-piece, fastened to a shaft 9 by means of a holder 21 on a face plate 20. The shaft is provided with a gear wheel 4. The holder for the sleeve-shaped work-piece is so designed, that a free space is left between the said work-piece in the opposite face plate 20, thus permitting the grinding wheel 28 to project through the open ends or the apertures on both sides of the sleeve-shaped work-piece, as shown by dot and dash lines in the figure.

The shaft 9 is journalled in two bearings 6, placed on a table 5, which table is movable by means of a hand-wheel 7 along a guide 8. By means of the gear-wheel 4 the shaft 9 is geared into a gear-wheel not visible in the drawing, fitted on a shaft 2. The shaft 2 is provided with a pulley 3 driven by a belt 32. The frame 1 is provided with a bracket 22 supporting a table 24, which is by means of a hand-wheel 25 movable in a guide 23 and which is positioned at an oblique angle to the guide 8. A shaft 16, provided with a pulley 18 is journalled in bearings 15 on the table 24, said shaft being driven by means of a belt 81 on the pulley 18. The centre-line of the shaft 16 intersects the prolonged centre-line of the shaft 9 in the centre of the spherical surface to be ground. The shaft 16 carries a grinding-wheel 28 which is adapted to come into rubbing contact with the work-piece 19.

In order to allow the grinding-wheel to be introduced into the hollow of the ring-shaped work-piece 19, the diameter of the grinding wheel as clearly shown in the drawing must not be larger than the diameter of the opening of the work-piece, the boundary of which opening is formed by the intersection of the spherical surface of which the cavity of the work-piece forms a portion, with the plane end face of the work. The plane of this opening is a tangential plane of the small sphere whose diameter is equal to the axial length of the work piece shown in the drawing with dot and dash lines within the ring-shaped work-piece 19. Thus a grinding-wheel of the size a_1 can be introduced, as the diameter of the circular tangential planes to this small sphere, which are cut out by the spherical surface of the cavity of the work-piece, is then of the same size as the diameter of the grinding tool. When rotating the work-piece 19 by the shaft 9 and the grinding wheel 28 by the shaft 16, the centre-lines of which shafts remain stationary during the grinding operation and intersect each other in the centre of

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the spherical surface of the cavity of the work-piece, an exactly spherical surface is imparted within the work-piece 19. In fact the grinding is effected along the surface of a zone of a sphere, forming the intersection between the operative surface of the grinding-wheel and the spherical surface within the work-piece. In the same degree as the grinding-wheel is worn, it is fed backwards in the direction of its shaft by means of the hand-wheel 25, so as to take up from the position a_1 the positions a_2 and a_3 and finally a_4 successively as shown with dot and dash lines in the drawing. During the whole time an exactly spherical surface will be formed, because of the fact that the above mentioned conditions are constantly at hand relative to the mutual position of the shafts, tool and work-piece. When the grinding-wheel has been reduced to the size a_4 it has reached its limit and can no longer be used for the same size of work-piece, but must be replaced with another grinding-wheel.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. Means for grinding concave spherical surfaces, in which the working-piece and the grinding tool are rotated about shafts. the centre lines of which intersect each other in the centre of the spherical surface to be formed, characterised in that the said centre lines remain stationary throughout the grinding operation.

2. A device according to Claim 1 comprising in combination a rotatable shaft, a grinding tool on one end thereof, another rotatable shaft, a holder on the last mentioned shaft for supporting a ring-shaped work-piece so as to leave a free space between the work-piece and the opposing end surface of the holder, and means for journalling said shafts so that their centre lines intersect each other in the centre of the spherical surface to be ground.

3. The improved device for grinding concave spherical surfaces substantially as set forth with reference to the accompanying drawing.

Dated this 18th day of May, 1920.

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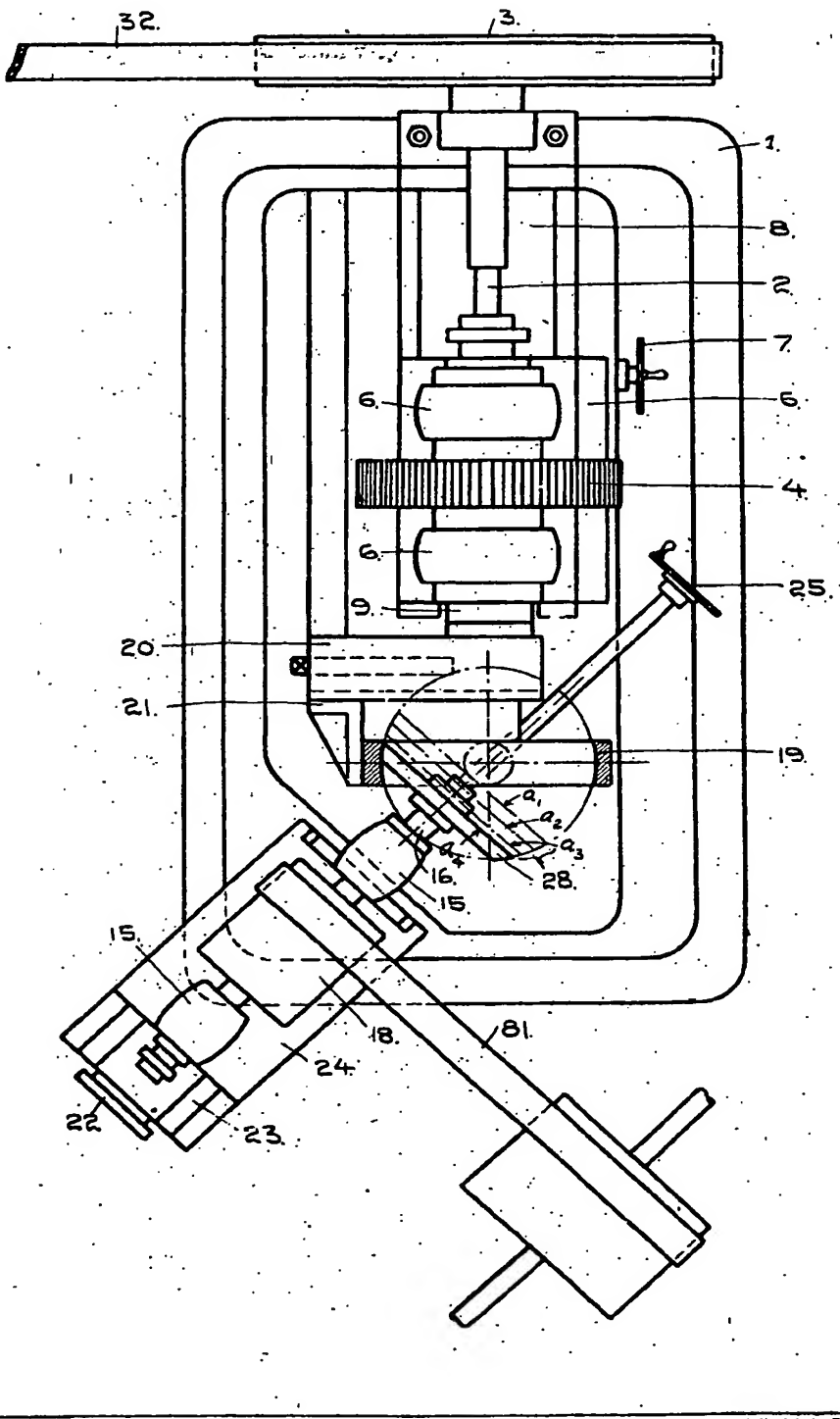

[This Drawing is a reproduction of the Original on a reduced scale.]

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